CLAIMS

What is claimed is:

1. An axially restrained-shrunk catheter balloon.

2. The catheter balloon of claim 1 wherein the balloon is a compliant or semi-compliant catheter balloon.

3. The catheter balloon of claim 1 having a predetermined compliance curve that is attained at least in part by the axially restrained shrinkage of the balloon.

4. The catheter balloon of claim 3 wherein the predetermined compliance is a non-linear compliance curve.

5. The catheter balloon of claim 1 wherein the balloon comprises a crosslinked polymer or a polymer with shrink memory.

6. The catheter balloon of claim 4 wherein the crosslinked polymer is crosslinked with a chemical crosslinker or wherein the crosslinked polymer is crosslinked using radiation.

7. The catheter balloon of claim 4 wherein the polymer with shrink memory comprises a stretch-oriented polymer.

8. The catheter balloon of claim 1 wherein the balloon is further coupled to a tubular element.

9. The catheter balloon of claim 8 wherein the balloon is welded to the tubular element.

10. The catheter balloon of claim 8 wherein the balloon has a balloon outer diameter and wherein the tubular element has a tubular element outer diameter, and wherein the balloon outer diameter and the tubular element outer diameter are the same.

11. A catheter balloon having a predetermined compliance curve that is attained at least in part by axially restrained shrinkage of the balloon.

12. The catheter balloon of claim 11 wherein the balloon has a wall length that remains the same or increases upon axially restrained shrinkage.

13. The catheter balloon of claim 11 wherein the compliance curve is a non-linear compliance curve.

14. The catheter balloon of claim 11 wherein the compliance curve has a reduced increase of diameter in a range of 14 atm to 20 atm as compared to a comparable catheter balloon that is produced without axially restrained shrinkage.

15. The catheter balloon of claim 11 wherein the balloon is a compliant or semi-compliant catheter balloon.

16. The catheter balloon of claim 11 wherein the balloon has an axial front end and an axial back end, and wherein axial restrained shrinkage is achieved by maintaining a distance between the front end and back end relative to each other.

17. The catheter balloon of claim 11 wherein the balloon has an axial front end and an axial back end, and wherein axial restrained shrinkage is achieved by increasing a distance between the front end and back end relative to each other.

18. The catheter balloon of claim 11 wherein the balloon comprises a crosslinked polymer or a polymer with shrink memory.

19. The catheter balloon of claim 11 wherein the balloon is coupled to a wire-guided catheter.

20. A compliant or semi-compliant catheter balloon for inflation to a pressure of between P_1 and P_2, wherein the balloon is formed from a polymer that is crosslinked such that the balloon has a reduced compliance in a pressure range of 70% of P_2 up to P_2.

21. The catheter balloon of claim 20 wherein the balloon is further heat treated under axial restraint to form the compliant or semi-compliant catheter balloon.

22. The catheter balloon of claim 21 wherein the polymer comprises a polyamide/polyether polyester.

24. The catheter balloon of claim 21 wherein the polyamide/polyether polyester is crosslinked using radiation.

25. The catheter balloon of claim 20 wherein P_1 is 1 atm and P_2 is 20 atm.

26. A method of manufacture of a medical device for dilation of a hollow anatomic structure, comprising a step of (1) forming a balloon from a polymer material, and (2) heating the balloon while axially restraining and radially shrinking to form an axially restrained-shrunk balloon.

27. The method of claim 26 further comprising a step of crosslinking the polymer material.

28. The method of claim 27 wherein the step of crosslinking comprises irradiating the polymer material or reacting the polymer material with crosslinking agent.

29. The method of claim 27 wherein the catheter balloon has a predetermined compliance curve that is attained by at least one of the steps of heating the balloon while axially restraining and crosslinking the polymer material.

30. The method of claim 26 wherein the step of forming the balloon comprises (1) heating a tubing comprising the polymeric material to a temperature that is above a glass transition temperature of the polymeric material and that is below a melting temperature of the polymeric material, and (2) longitudinally stretching the heated tubing.

31. The method of claim 26 wherein the polymer material is crosslinked.

32. A stent with a substantially continuous outer surface comprising a polymer material with expansion memory in a configuration that radially expands the stent when the stent is heated from a first to a second temperature, and wherein the configuration is obtained by radial compression.

33. The stent of claim 32 wherein the configuration is obtained by radial compression of the stent under axial restraint at an elevated temperature.

34. The stent of claim 32 wherein the polymer material is crosslinked.

35. A catheter comprising the catheter balloon of claim 1 or 11, wherein the catheter has an outer diameter and wherein the catheter balloon has an outer diameter that is equal or less that the catheter outer diameter.